

What is claimed is:

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1. A rotodynamic pump comprising:  
a housing having an axis, an inlet and outlet in fluid communication with a chamber,  
a rotor having an impeller received in the  
5 chamber; and  
a stationary bearing element for rotatably supporting the rotor, the stationary bearing element having, in radial cross-section, a non-circular geometry.
2. The pump defined in claim 1, wherein the non-circular geometry includes a circular portion.
3. The pump as defined in claim 1 wherein the geometry includes a semi-elliptical portion.
4. The pump as defined in claim 1 wherein the stationary bearing element extends within the rotor.
5. The pump as defined in claim 1 wherein the geometry includes a circular portion in a region near a load zone of the bearing and an elliptical portion in a region opposite the load zone.
6. The pump as defined in claim 1 further comprising a magnetic drive element for driving the rotor, the drive element being radially offset relative to an axis of the stationary bearing element to produce a  
5 predetermined radial force on the rotor.
7. The pump as defined in claim 1 wherein the stationary bearing element extends within the rotor and wherein the radial clearance between the rotor and the stationary bearing element is larger in an area opposite  
5 a load zone of the bearing than in the load zone.

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8. A rotodynamic pump comprising:  
a housing having an axis and an inlet and an outlet in fluid communication with a chamber;  
a shaftless rotor received in the chamber for selective rotation relative to the housing;  
a drive for rotating the rotor relative to the housing including a drive element and a driven element operatively associated with the rotor; and  
a stationary bearing element for rotatably supporting the rotor, the stationary bearing element having, in radial cross-section, a non-circular geometry.

9. The pump defined in claim 8, wherein the non-circular geometry includes a circular portion.

10. The pump as defined in claim 8 wherein the geometry includes a semi-elliptical portion.

11. The pump as defined in claim 8 wherein the stationary bearing element extends within the rotor.

12. The pump as defined in claim 8 wherein the geometry includes a circular portion in a region near a load zone of the bearing and an elliptical portion in a region opposite the load zone.

13. The pump as defined in claim 8 further comprising a magnetic drive element for driving the rotor, the drive element being radially offset relative to an axis of the stationary bearing element to produce a predetermined radial force on the rotor.

14. The pump as defined in claim 8 wherein the stationary bearing element extends within the rotor and wherein the radial clearance between the rotor and the stationary bearing element is larger in an area opposite a load zone of the bearing than in the load zone.

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15. A rotodynamic blood pump comprising:

5 a housing having an inlet and an outlet in fluid communication with a chamber, the housing including a stationary bearing element that extends axially inward to the chamber from an end wall;

10 an annular rotor received in the chamber around the stationary bearing element for selective rotation relative thereto, the rotor being spaced from the stationary bearing element and the housing to define radially spaced first and second passages, the first passage extending between the inlet and outlet and containing an impeller blade set on the rotor for urging flow from the inlet to the outlet;

15 a drive for rotating the rotor relative to the housing, including a ferromagnetic assembly received in the rotor and an electric motor stator and winding assembly installed in the housing, an axis of the motor stator being radially displaced relative to an axis of the housing; and

20 the second passage being narrowed to form a fluid bearing, the stationary bearing element having, in radial cross-section, a non-circular geometry.

16. The pump defined in claim 15, wherein the non-circular geometry includes a circular portion.

17. The pump as defined in claim 15 wherein the geometry includes a semi-elliptical portion.

18. The pump as defined in claim 15 wherein the stationary bearing element extends within the rotor.

19. The pump as defined in claim 15 wherein the geometry includes a circular portion in a region near a load zone of the bearing and an elliptical portion in a region opposite the load zone.

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20. The pump as defined in claim 15 wherein the stationary bearing element extends within the rotor and wherein the radial clearance between the rotor and the stationary bearing element is larger in an area opposite  
5 a load zone of the bearing than in the load zone.

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